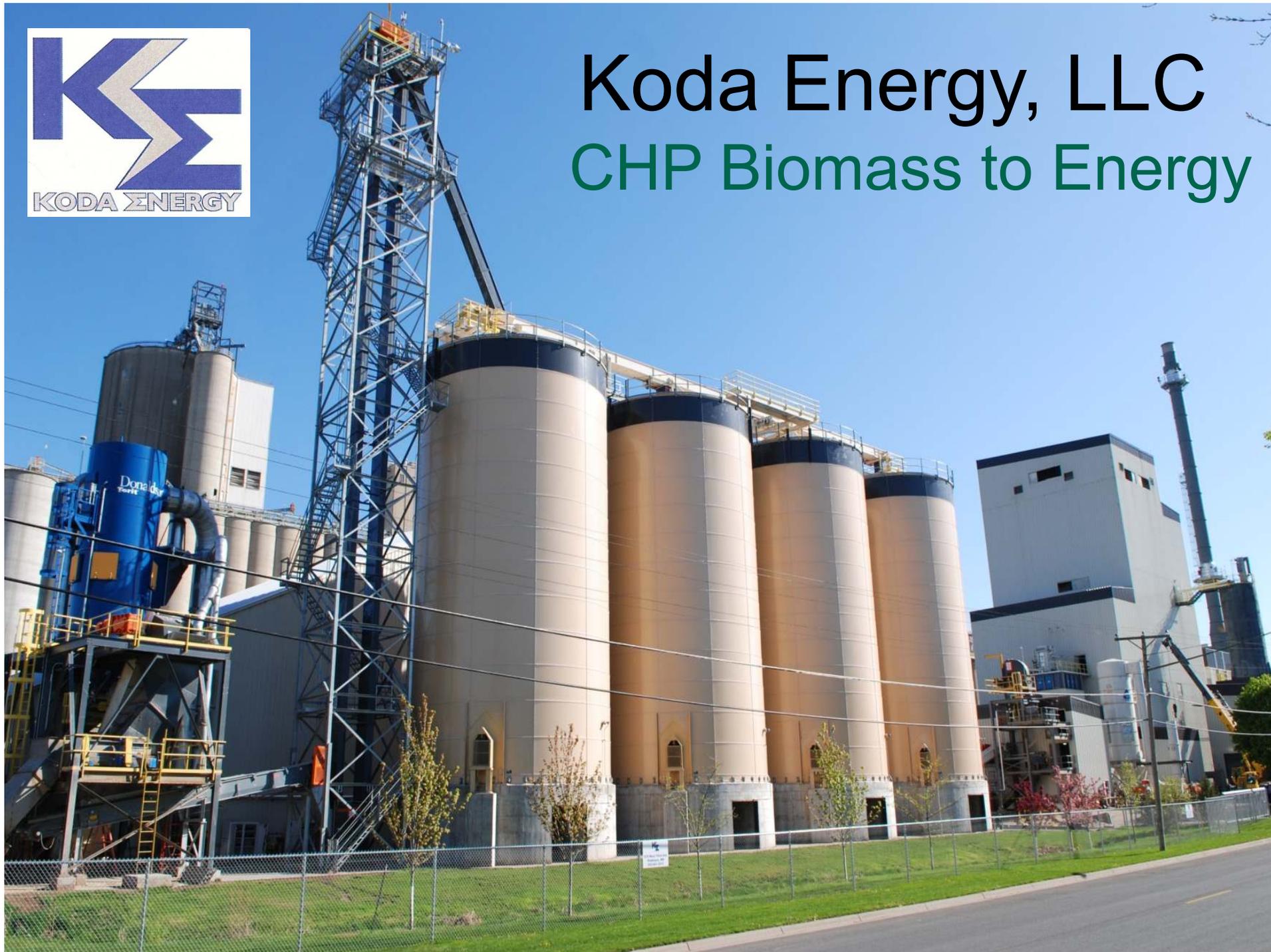




# Koda Energy, LLC

## CHP Biomass to Energy



# What is Koda Energy, LLC.?

- Koda is a partnership between Rahr and SMSC that creates “green energy” from burning dry biomass fuels
- Koda’s combined heat and power plant (“CHP”) is located on Rahr property in Shakopee, MN
- Designed to service Rahr’s thermal load

# Rahr Malting Company



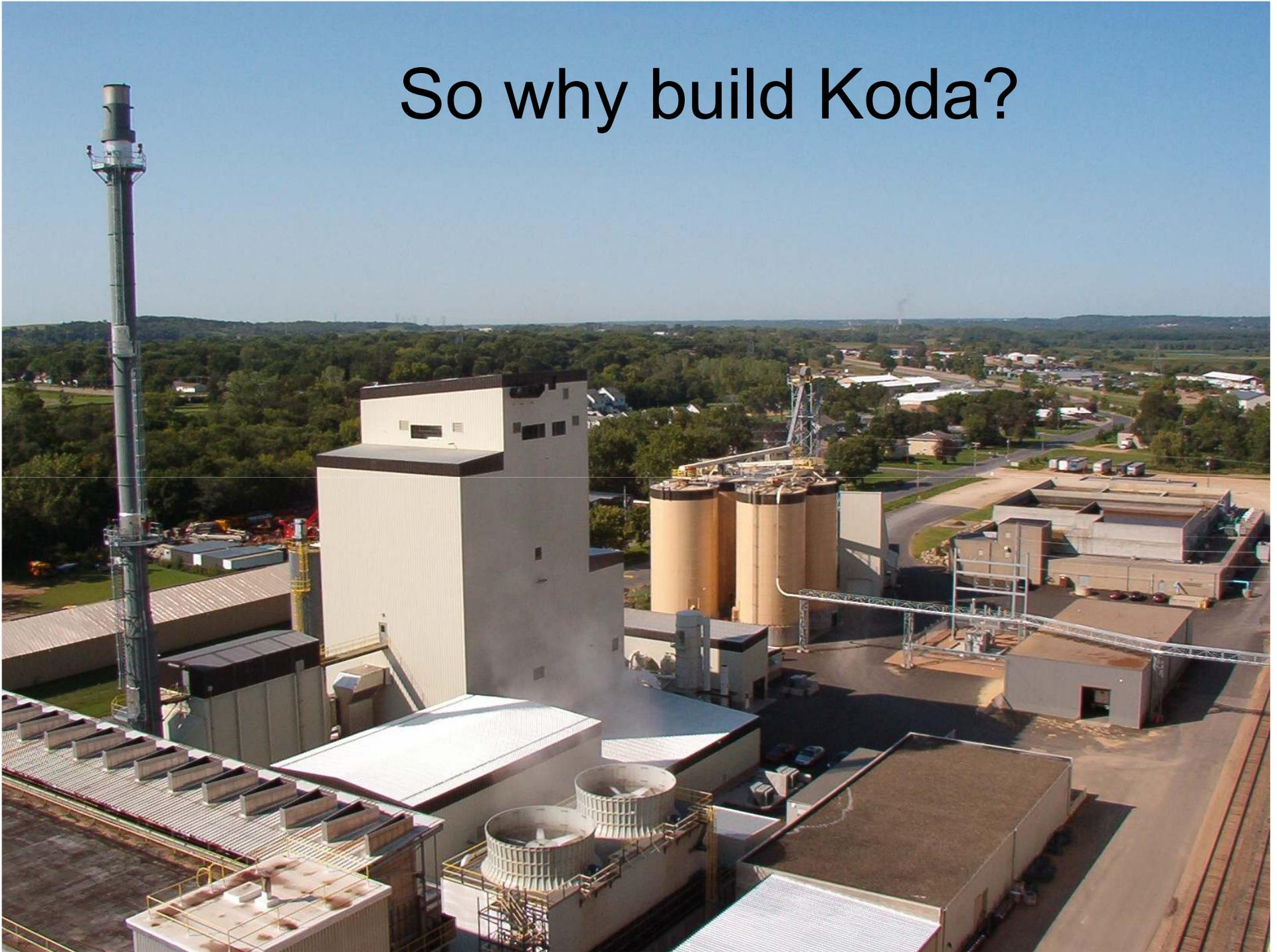
- The Rahr family has made malt for 165 years
- Operational in Shakopee since 1936
- Shakopee plant is the 2<sup>nd</sup> largest malting facility in the world
- Shakopee plant employs over 100 highly skilled workers

# Shakopee Mdewakanton Sioux Community (SMSC)



- A federally recognized Indian Tribe
- The largest employer in Scott County

So why build Koda?

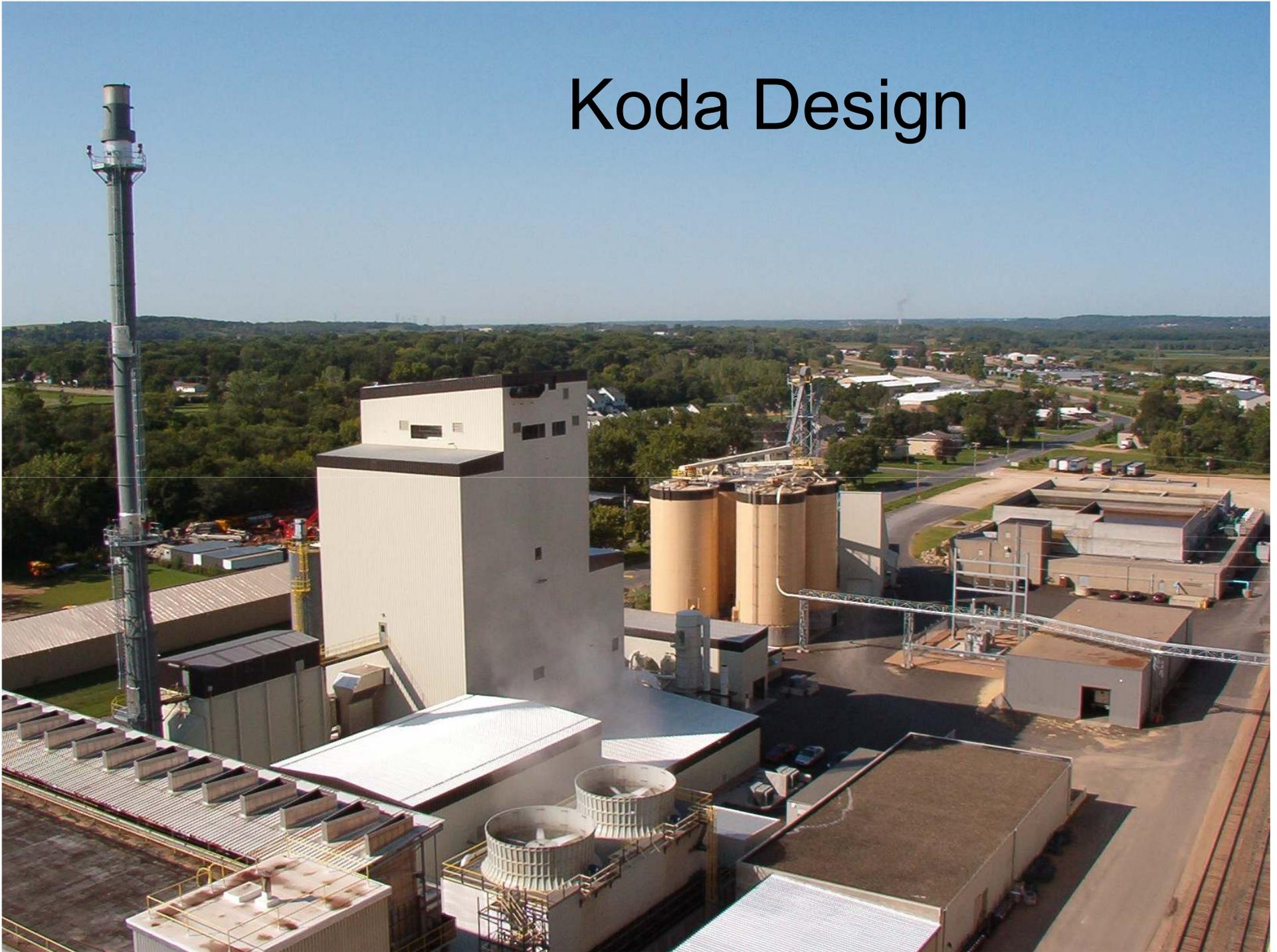


# 2007 View

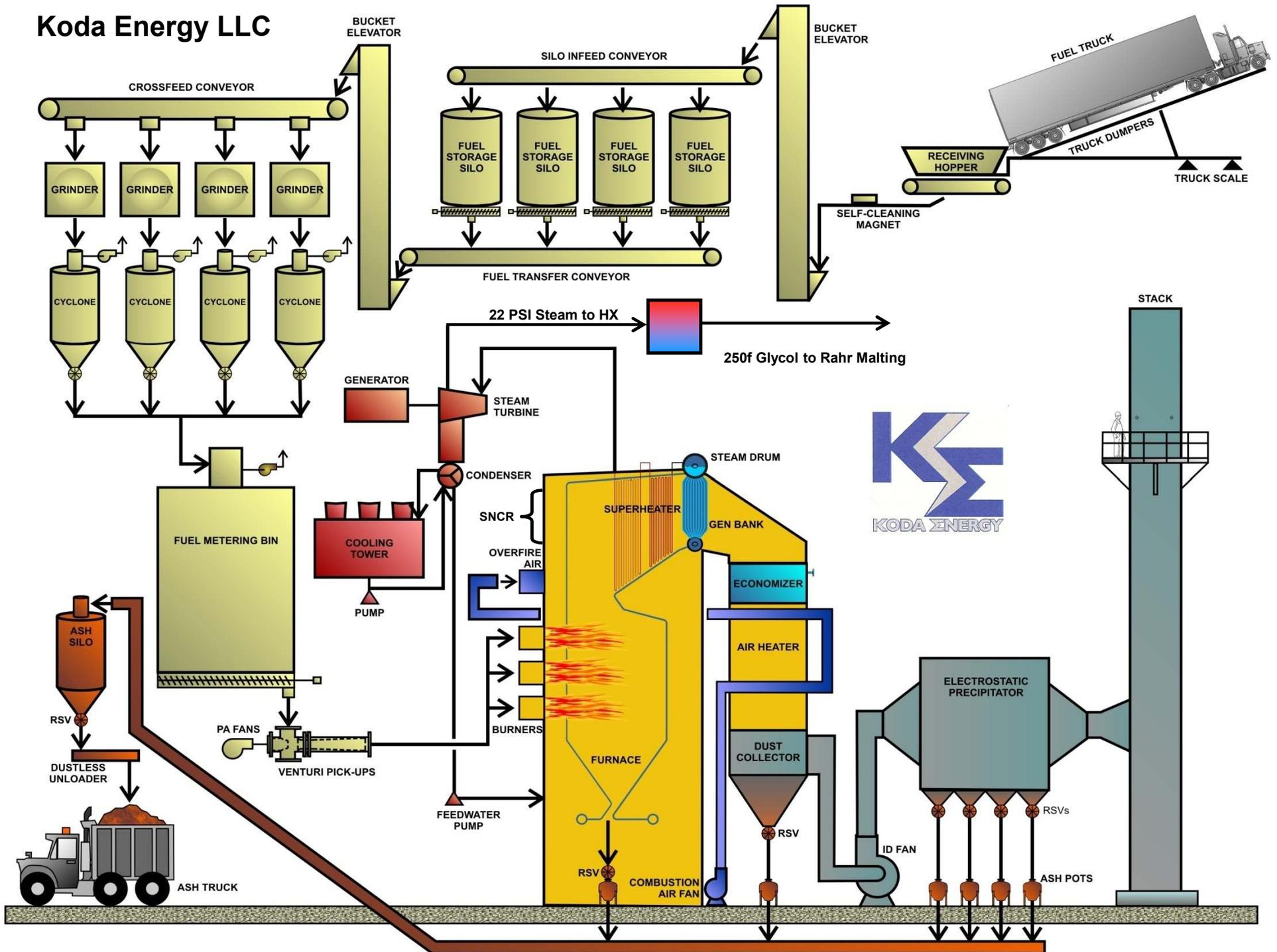
“Environmental Stewardship and Favorable Economics”

- Renewable **base-load** energy production had value
- Expensive natural gas market
- Highly efficient combined heat and power (“CHP”)
  - Rahr purchases all of the heat generated from Koda to replace its natural gas usage
    - ~1.1 million mmbtus of natural gas/year
  - The electricity generated from Koda is:
    - Purchased by the partners at avoided energy costs
    - Sold to Xcel Energy as “Green Power”
- Favorable Carbon Market Development

# Koda Design



# Koda Energy LLC

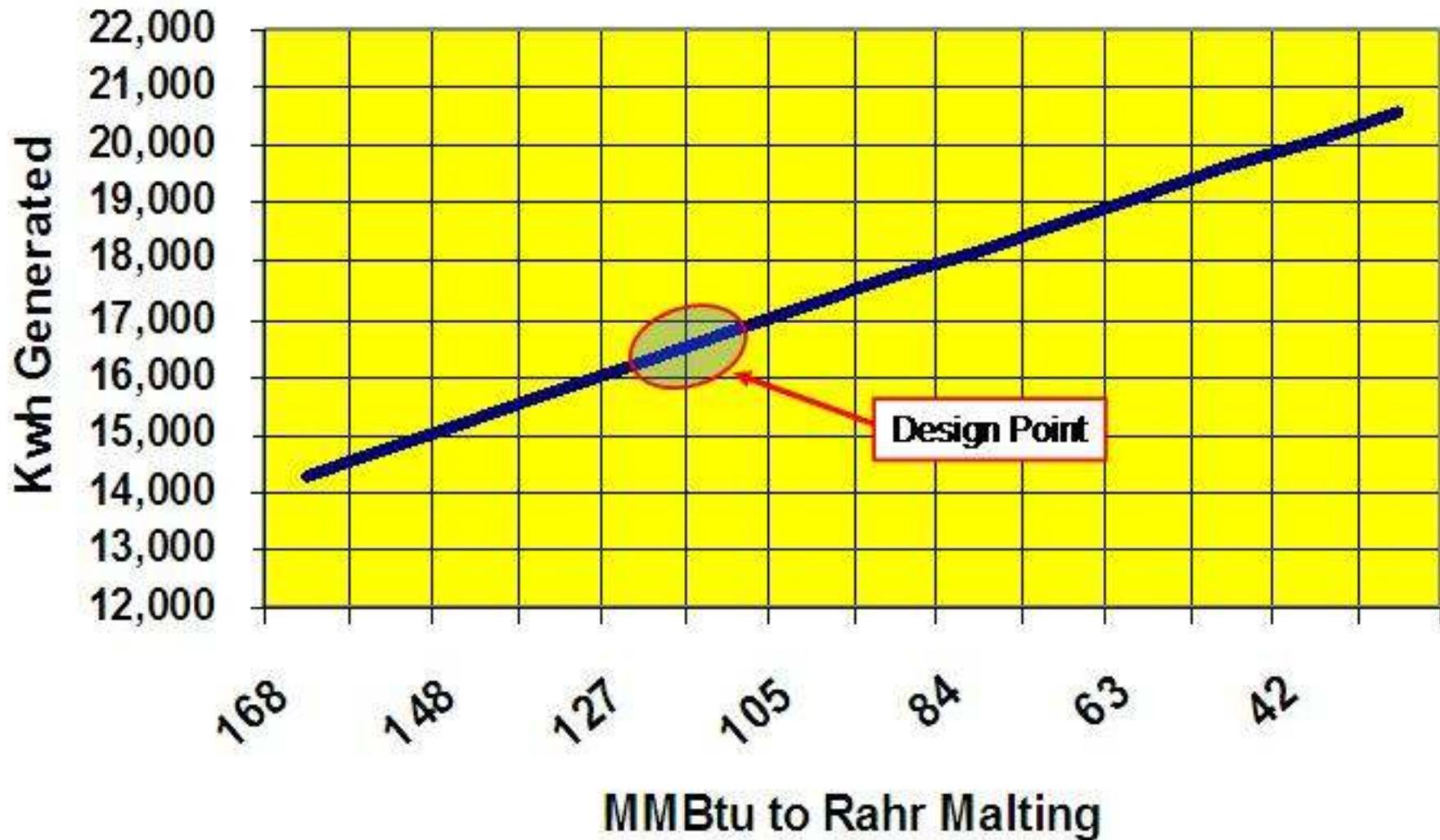


# Biomass Fuels

(100% Agricultural Material)

- First multi-fuel suspension boiler – flexibility & efficiency
- Biomass fuels supplied by Rahr, local food & agribusinesses and farmers in a 75 mile radius
- Annual fuel requirement - 175,000 tons
  - Rahr – 35,000 tons/year from by-products
  - Dry Wood
  - Oat Hulls – Long-term contracts and spot purchases

# Koda Net Electrical Output



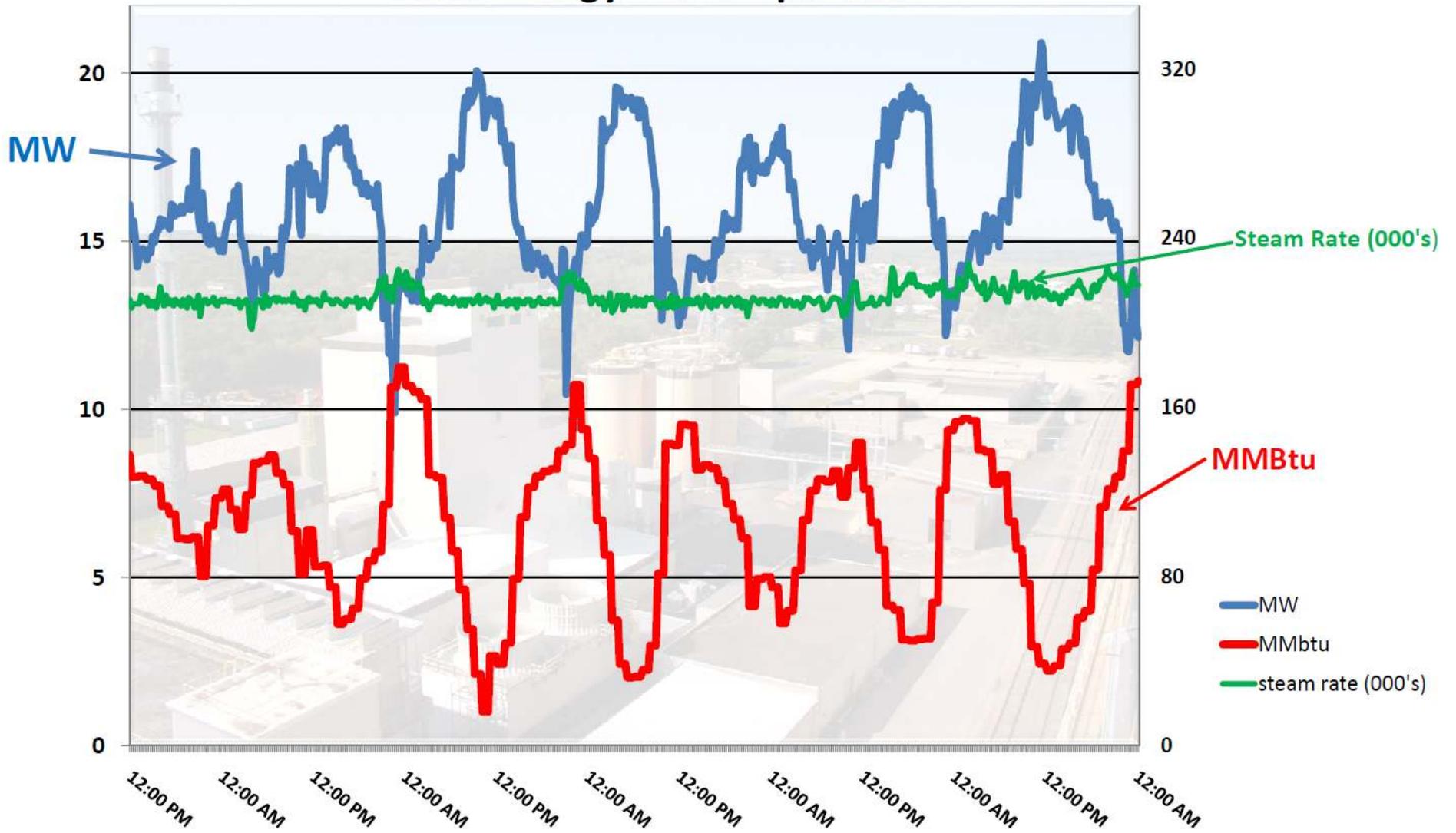
Has Koda been successful?



# Koda has been an engineering success!

- Plant Uptime:
  - 2010-2011 = 90%
  - 2011-2012 = 93%
- Boiler Efficiency ~80%
- Plant Efficiency = > 55%

# Koda Energy Plant Operation



# Average Capacity Factors by Energy Source in 2009

• Combined Cycle Natural Gas Plant	10.1%
• Oil	7.8%
• Hydroelectric	39.8%
• Renewables (Wind/Solar/Biomass)	33.9%
• Coal	63.8%
• Nuclear	90.3%
• <b><i>Koda Energy (2010)</i></b>	<b>73.4%</b>

*Data provided by the US Energy Information Administration (EIA)*

# Economic Success To MN?

Yes

## \$12.5 million into Minnesota Economy

- Direct employment
  - \$1.7 million/yr
  - Skilled workers
- Indirect support of local employment through operating expenditures
  - \$1.4 million/yr
  - Services, engineering, construction
- Biomass purchases in State of Minnesota
  - \$9.4 million/yr
  - Not supporting gas, oil, coal from other states

# Economic Challenges

## CHP Biomass Challenges

- Annual Economics:
  - Biomass costs - \$3.5 Million more than expected



# Significant Biomass Price Changes

<u>Biomass</u>	<u>2007</u>	<u>2011</u>
Malt sprouts	\$44/ton	\$109/ton
Wheat midds	\$92/ton	\$220/ton
Wood by-products	\$38/ton	\$75/ton

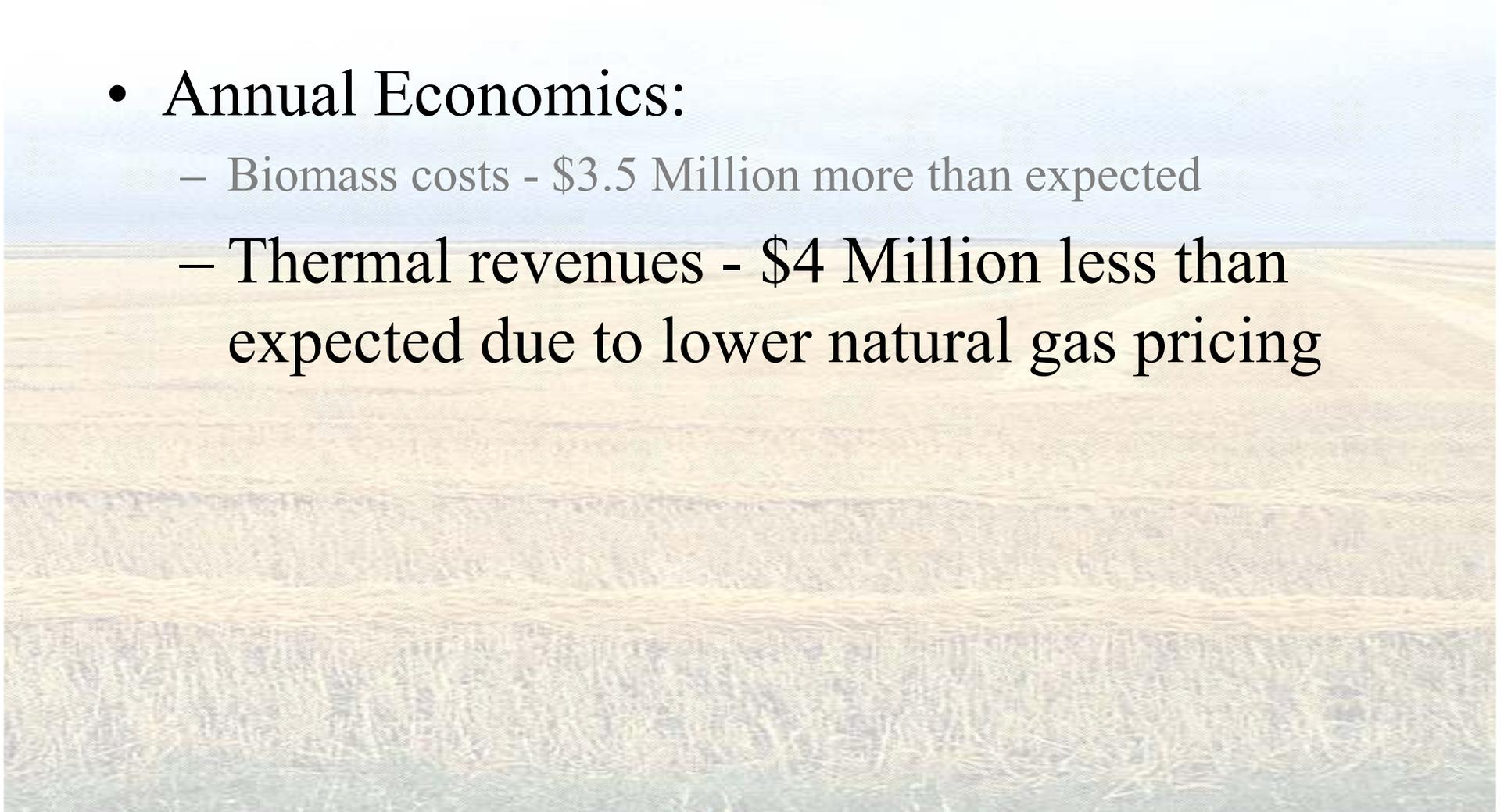
## **Economics affected by**

- downturn in economy which reduced supply of dried wood byproducts
- increased competition from ethanol, and other biomass facilities

# Economic Challenges

## CHP Biomass Challenges

- Annual Economics:
  - Biomass costs - \$3.5 Million more than expected
  - Thermal revenues - \$4 Million less than expected due to lower natural gas pricing



# 2012 Natural Gas Strip December 2006 to Present



Decision to  
build Koda

Koda construction  
period

Commercial  
Operation

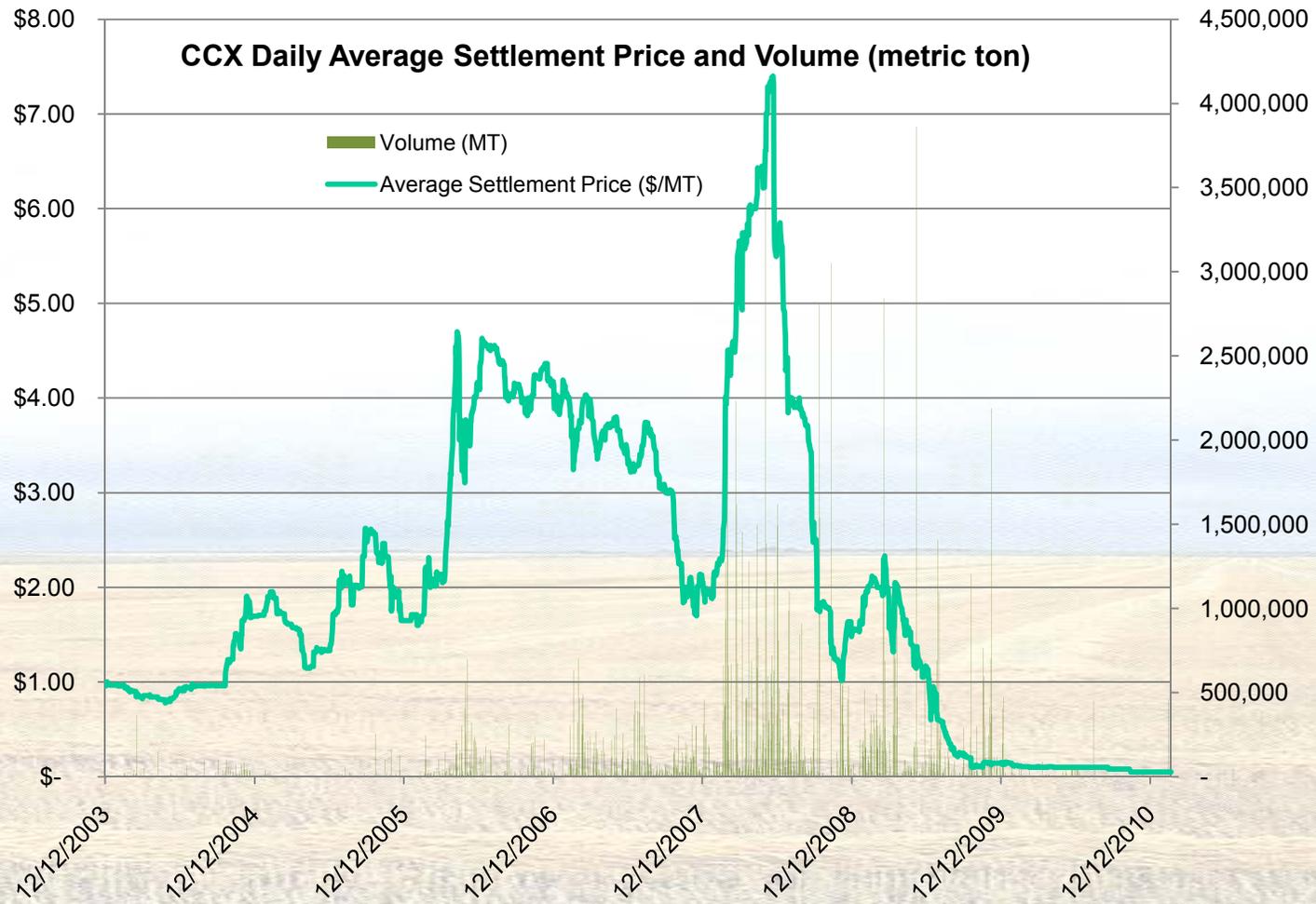
Today

# Economic Challenges

## CHP Biomass Challenges

- Annual Economics:
  - Biomass costs - \$3.5 Million more than expected
  - Thermal revenues - \$4 Million less than expected
  - Disappearance of carbon credit and REC markets
  - PPA for renewable energy IPP' s **NOT** favorable

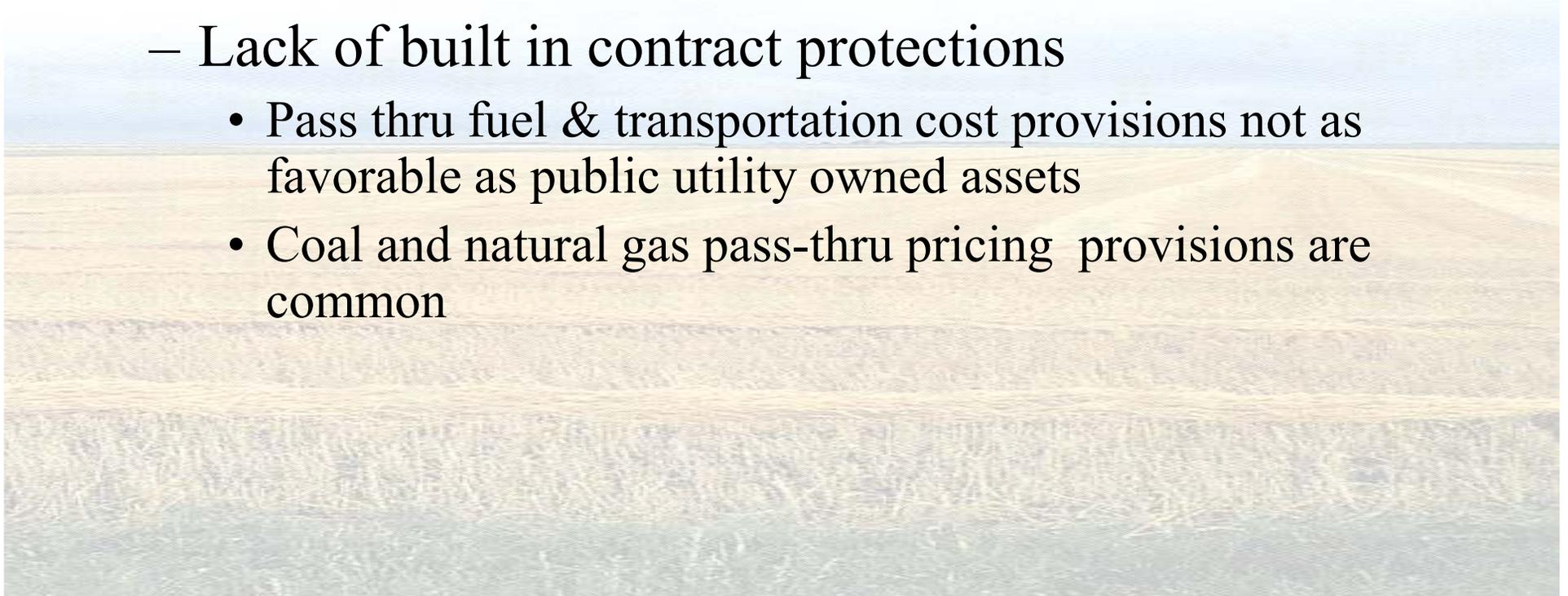
# Carbon Credits



*Data provided by Intercontinental Exchange (ICE)*

# Power Purchase Agreements

- PPA for Renewable IPP (non mandated projects)
  - Minimal bargaining power for IPP biomass plants
  - No “real value” included for base load capabilities
  - Lack of built in contract protections
    - Pass thru fuel & transportation cost provisions not as favorable as public utility owned assets
    - Coal and natural gas pass-thru pricing provisions are common



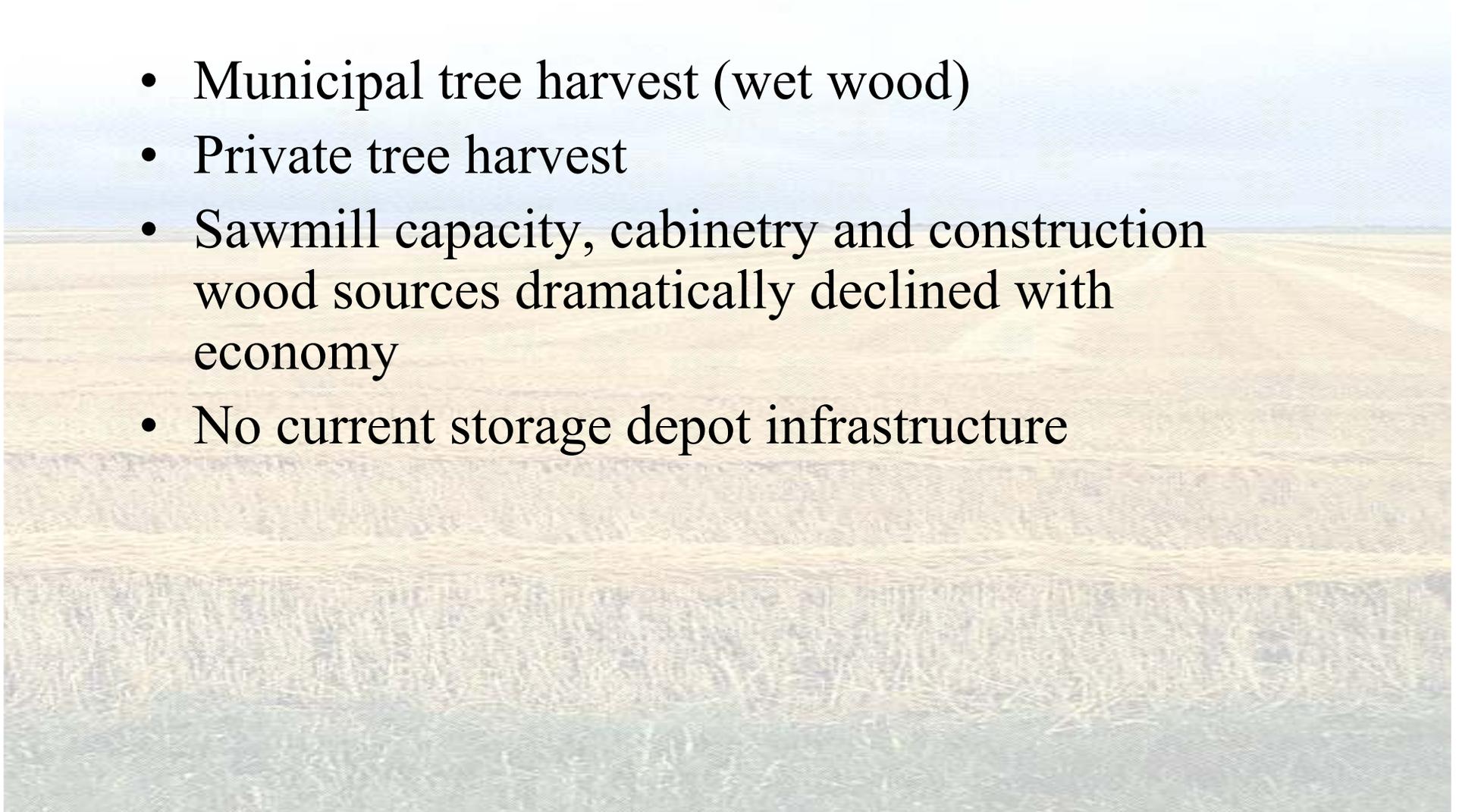
# Economic Challenges

## CHP Biomass Challenges

- Annual Economics:
  - Biomass costs - \$3.5 Million more than expected
  - Thermal revenues - \$4 Million less than expected
  - Depressed carbon credit and REC markets
  - PPA for renewable energy IPP' s NOT favorable
- Insufficient Biomass Infrastructure Development

# Wood and Wood By-Products for Fuel

- Municipal tree harvest (wet wood)
- Private tree harvest
- Sawmill capacity, cabinetry and construction wood sources dramatically declined with economy
- No current storage depot infrastructure



# Grasses/Corn Stover for Fuel???

- 7000-8000 btu/lb (10%<sub>mst</sub>)
- Annual Harvest
- Bail Storage
- Current price = ???
- 3-4 ton/acre = ~64 mmbtu
- 5000-7000 acres for 15% of our fuel needs

## Additional Costs to Factor

- Storage
- Transportation
- Grinding



# Does the State of Minnesota want Bio-Energy CHP to Succeed?

- If Yes:
  - Develop a biomass collection infrastructure
    - Create biomass fuel storage and distribution depots
    - Create assistance on transportation
  - Create meaningful PPA incentives that encourage CHP capabilities and fuel price pass-thru options
  - Utilize State resources & programs to assist existing bio-energy operations
  - Leverage federal programs for renewable energy development